Bossier Parish Community College
Master Syllabus

Course Prefix and Number: BLGY 101/101L **Credit Hours:** 4

Course Title: General Biology I

Course Prerequisites: None

Textbooks: Mader, S.; Biology, 10th edition
Mader, S.; Laboratory Manual: Biology, 10th edition

Course Description:
This course is an introduction to the basic principles of biology for the science major. Topics include a short history of biology, scientific method, basic chemistry of life, cell structure and function, photosynthesis, cell respiration, cell reproduction, genetics, evolution and ecology. Laboratory activities reinforce lecture.

Learning Outcomes:

At the end of this course students will:

A. integrate knowledge of cell structure and function with an understanding of the basic biological principles;
B. relate basic genetic principles to DNA structure and common patterns of inheritance;
C. critique the theory of natural selection with respect to its relationship to evolutionary theory;
D. relate the organization and structure of the biosphere to its impact on living organisms;
E. demonstrate competency in the use of basic biological laboratory equipment; and
F. integrate data collected in the lab to interpret and support basic biological principles.

To achieve the learning outcomes, the student will:

1. list some of the major scientists and their contribution to the understanding of the major biological principles. (A,B,C)
2. list and explain 5 characteristics of life. (A,B,C)
3. classify organisms into the correct kingdom based on their characteristics. (D)
4. outline the steps of the scientific method. (F)
5. apply scientific method to solve a problem. (F)
6. explain the relationship between a hypothesis, a theory, and a law. (F)
7. name and describe the subatomic particles of an atom. (D)
8. describe and discuss the energy levels of an atom. (D)

9. draw a simplified atomic structure of an atom with an atomic number less than 20. (D)
10. distinguish between covalent, ionic and hydrogen bonds. (D)
11. describe the properties of water and their importance to living things. (A,D)
12. define an acid and a base; describe the pH scale, and state the significance of buffers. (A,D)
13. categorize organic compounds into the four major groups and list characteristics and functions of each group. (A,B,D)
14. define isomer and give examples. (A)
15. give examples of monosaccharides, disaccharides, and polysaccharides. (A,D)
16. relate the 4 levels of structure of proteins to the bonding patterns observed at each level. (A,D)
17. compare the structure of DNA to RNA. (B)
18. recall the basic concepts of Cell Theory. (A)
19. identify basic cell structures and explain the function of each organelle. (A)
20. list the organizational levels from atoms to ecosystems. (D)
21. compare the structure of a prokaryotic and eukaryotic cell. (A)
22. list 4 evidences for the endosymbiotic theory. (A,C)
23. define diffusion and osmosis, and explain their relevance to cell biology. (A)
24. describe the appearance of a plant cell and an animal cell in isotonic, hypotonic and hypertonic solutions. (A)
25. contrast endocytosis and exocytosis. Give examples of endocytosis. (A)
26. state and explain the 1^{st} and 2^{nd} laws of thermodynamics. (A)
27. describe the structure and function of enzymes. (A)
28. explain feedback inhibition and how it controls some metabolic pathways. (A)
29. explain the relationship of coenzymes to enzymes and chemical reactions. (A)
30. describe the structure and function of ATP. (A)
31. give examples of the importance of photosynthesis to living things. (A)
32. relate the visible light range to photosynthesis, and describe the role of chlorophyll. (A)
33. describe the structure and function of chloroplast. (A)
34. explain the terms: light-dependent and light-independent reactions and describe their relationship to each other. (A)
35. contrast the Calvin cycle to the C4 and CAM pathways. (A)
36. describe the general function of cellular respiration. (A)
37. list the major events of glycolysis, transition, and Kreb's cycle. (A)
38. distinguish between oxidative phosphorylation and substrate-level phosphorylation. (A)
39. discuss the structure and function of the electron transport chain. (A)
40. calculate the yield of ATP molecules per glucose molecule for aerobic respiration and fermentation. (A)
41. discuss the concept of a metabolic pool and how the breakdown of carbohydrate, proteins, and fats contributes to the pool. (A)
42. relate cell division to the reproduction of unicellular organisms and the growth and repair of multicellular organisms. (A,B)

43. state the stages of the cell cycle of a eukaryotic cell, and describe what happens during each stage. (A,B)
44. draw a series of diagrams illustrating the phases of mitosis and tell what happens in each phase. (A,B)
45. state at least two differences between plant and animal mitosis. (A,B)
46. describe the prokaryotic chromosome and the process of binary fission. (A.B)
47. state the general role of meiosis in plant and animal. (A)
48. describe and state the significance of homologous chromosome pairs. (A)
49. describe synapsis and tell how crossing-over occurs. (A,B)
50. compare meiosis to mitosis. (A,B)
51. compare spermatogenesis to oogenesis. (A,B)
52. state Mendel's laws of segregation and independent assortment. (A,B)
53. solve genetics problems using Punnett square. (monohybrid and dihybrid). (B,F)
54. explain the use of a testcross to determine the genotype of an individual. (B,F)
55. recognize and solve genetics problems involving degrees of dominance. (B)
56. describe the normal chromosomes makeup of human males and females. (B,F)
57. solve problems involving gene-linkage and sex-linkage. (B,F)
58. identify gene location by using the results of crosses involving linked genes. (A,B,F)
59. give examples of mutations caused by changes in chromosome number and explain how this could happen. (B)
60. give examples of mutations caused by changes in chromosome structure and explain how this could happen. (B)
61. describe how a karyotype is prepared, of what it consists and how it is used. (B)
62. list and describe different types of sex chromosomal abnormalities seen in humans. (B)
63. give examples and describe the most common autosomal genetic disorders in humans. (A,B)
64. give examples and describe the most common X-linked genetic disorders in humans. (A,B)
65. describe the polygene inheritance pattern and give examples of traits that are most likely controlled by polygenes. (B)
66. describe the transformation experiment of Griffith, including his surprising results. (A,B)
67. tell how Avery showed that DNA is the transforming substance. (B)
68. describe the experiments of Hershey and Chase with T_2 bacterophages. (B)
69. describe the Watson and Crick model of DNA, and tell how it fits the Chargaff and Franklin data. (B)
70. describe the semiconservative manner in which DNA replicates. (A,B)
71. contrast the process of DNA replication in prokaryotes and eukaryotes. (A,B)
72. list the biochemical differences between RNA and DNA. (B)
73. show that the DNA triplet codes are almost universal. (A,B)
74. describe the process by which RNA becomes complementary to DNA. (A,B)
75. describe the roles of ribosomes, mRNA, tRNA, and amino acids during protein synthesis. (B)

76. determine the mRNA codons, possible tRNA anticodons, and sequence of amino acids in the resulting protein when given a DNA coding strand and table of codons. (A,B)
77. list and define the components of an operon. (A,B)
78. contrast the pre-Darwinian view on evolution to post-Darwinian. (B,C)
79. describe LaMarck's theory and point out the fallacies in his theory. (C)
80. list the major influences on Darwin leading to his theory of natural selection. (C)
81. explain how the fossil record, biogeography, comparative anatomy, comparative embryology and comparative biochemistry support the hypothesis of common descent. (C)
82. state the sources of variation in a population of sexually reproducing diploid organisms. (C,D)
83. explain the Hardy-Weinberg rule. (C,D)
84. list and discuss the agents of evolutionary change. (C)
85. distinguish between directional, stabilizing, and disruptive selection by giving examples. (D)
86. explain the biological definition of a species. (C,D)
87. explain the process of adaptive radiation and give examples. (D)
88. calculate the rate of natural increase for a population when given the number of individuals in the population, the birth rate, and the death rate. (D)
89. contrast a J-shaped growth with an S-shaped growth curve. (D,F)
90. describe the growth curve for the world's population. (D)
91. discuss the effect that interspecific competition can have on population size. (C,D)
92. state the competitive exclusion principle, and relate this principle to the diversity of organisms. (E)
93. distinguish between the niche and the habitat of an organism. (D)
94. discuss the effect that predation can have on the size of the prey population and on the diversity of the community. (D)
95. give examples to show that human interference can upset the natural balance of a community. (D)
96. explain the principle of mimicry, and give two examples. (D)
97. give examples of the three types of symbiotic relationships, and explain the effect they can have on population size. (D)
98. give an example of a food web, and define trophic level. (D)
99. identify the parts of compound light dissection microscopes and give the function of each part. (E)
100. utilize the compound light and dissection microscopes to study specimens in the laboratory. (E)
101. display and analyze data using appropriate scientific and mathematical tools. (F)
102. use scientific method to collect data and solve problems in a laboratory setting. (F)
103. utilize various metric measuring devices to accurately collect data. (E)

Course Requirements

- minimum of 50% on each section exam or 60% on each section of the final exam
- minimum of 60% average on laboratory summary reports
- demonstrate the ability to correctly utilize the light microscope
- satisfactory review of scientific literature

Course Grading Scale:

A- 90% or more of the total points possible for the semester; and score a minimum of 50% on each unit test or score 60% on each unit section of the final test; and demonstrate to the instructor the ability to correctly utilize a compound light microscope; and score a minimum of 60% average on lab summaries/ reports; and submit a satisfactory summarization of 3 articles from current scientific journals.

B- 80% or more of the total points possible for the semester; and score a minimum of 50% on each unit test or score 60% on each unit section of the final test; and demonstrate to the instructor the ability to correctly utilize a compound light microscope; and score a minimum of 60% average on lab summaries/ reports; and submit a satisfactory summarization of 3 articles from current scientific journals.

C- 70% or more of the total points possible for the semester; and score a minimum of 50% on each unit test or score 60% on each unit section of the final test; and demonstrate to the instructor the ability to correctly utilize a compound light microscope; and score a minimum of 60% average on lab summaries/ reports; and submit a satisfactory summarization of 3 articles from current scientific journals.

D- 60% or more of the total points possible for the semester; and score a minimum of 50% on each unit test or score 60% on each unit section of the final test; and demonstrate to the instructor the ability to correctly utilize a compound light microscope; and score a minimum of 60% average on lab summaries/ reports; and submit a satisfactory summarization of 3 articles from current scientific journals.

F- less than 60% of the total points possible for the semester; or less than 50% on any unit tests or less than 60% on the unit section of the final test; or failure to demonstrate to the instructor the ability to correctly utilize a compound light microscope; or score less than 60% average on lab summaries/reports; or fail to submit a satisfactory summarization of 3 articles from current scientific literature

Reviewed by Kelley Corkern/ March 2009